Small, dense quark stars from QCD inspired equations of state

E.S. Fraga, R.D. Pisarski [a] J. Schaffner-Bielich [b]

[a] *Department of Physics, Brookhaven National Laboratory*

[b] *RIKEN BNL Research Center, Brookhaven National Laboratory*

Presented by: E.S. Fraga

Abstract

The equation of state for cold quark matter is studied in perturbative quantum chromodynamics up to second order in the strong coupling constant α_s. We find a reasonable convergence of the perturbative expansion for the thermodynamic potential at a quark chemical potential of $\mu \approx 1$ GeV. The equation of state allows for a new class of solution at high density besides the one for ordinary neutron stars which is formed by deconfined matter. The resulting mass-radius relation exhibits extremely dense and small stars.

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